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# Memorandum

**Date:** 2nd March 2017

**To:** Craig Hall

**CC:** Carl Popal

**From:** Adam Elliston

**RE: Historical exploration review for EL 27567 – Mt Wells Area, Northern Territory**

**Introduction**

The purpose of this report is to examine past exploration on EL 27567 to ascertain going forward, future exploration strategies for the tenement. Past exploration on the residual two graticular blocks left of the original tenement has included stream sediment sampling and soil sampling. This sampling was undertaken in the 2000 and 1999 field seasons by Acacia Resources Ltd and Northern Gold, of which both companies were very active in the Pine Creek region at the time.

**Location**

EL 27567 is located on the Pine Creek 1:250,000 and 1: 100,000 map sheets 35 kilometres North West of the township of Pine Creek and approximately 150 kilometres south from the city of Darwin. Access is via the Stuart Highway from Darwin and the Mt Wells road that runs parallel to the Adelaide to Darwin rail line. The tenement consists of two graticular blocks totalling 6.7 square kilometres. Figure 1.


Figure 1 Tenement Location

**Regional geology Pine Creek Geosyncline (PCG)**

Archean granites and amphibolites facies paleo-Proterozoic sediments form the basement rocks of the PCG. Unconformably overlying this is a second depositional event of meso – Proterozoic rocks which are divided into three groups.

1. The Bachelor Group – Shallow water clastics and crystalline carbonates
2. The South Alligator Group – Pelagic carbonaceous shale with interbedded turbidites , iron formations, tuffs, carbonates and non carbonaceous shales
3. Finniss River Group – Thick sequence of flysh type turbidites.

Structurally regional compression commenced during the deposition of the Frances Creek Group and varied in intensity as a function of proximity to the Archean basement domes. Two deformational regimes formed during this period of compression and exhibited the following features;

D1 Bedding concordant structures ie: detachment faults and folding (decollements) and bedding parallel cleavage (S1).

D2 Further folding and associated slatey cleavage (S2) and zones of intense compression which formed steep deep seated N-S wrench and thrust faults.

Periods of relaxation in this regime of compression allowed the intrusion of basic doleritic sills (Zamu dolerite) and lamprophyre dykes whilst resumption of compression during the deposition of the Finniss River Group Regional resulted in regional greenschist facies metamorphism .

Lastly the intrusion of highly oxidised reduced granites into the sediment package which represents melting portions of the Archean basement when compression ceased.

Four styles of mineralisation have been identified in the PCG (Ormsby, Nicholson and Butler 1994) these are;

1. Stratiform – within mudstones and iron formations of the Frances Creek Group
2. Polymetallic Vein Style – within discordant wrench faults and stockwork/concordant gold/quartz mineralisation formed during unloading creating zones of dilation and open space.
3. Unconformity related uranium/gold/platnoid mineralisation – occurring within structures/conduits that are adjacent to the paleo-meso Proterozoic unconformity and spatially close to carbonaceous / carbonate units and ferromagnesian alteration.

Metamorphism consists of distinct zonation's within differing regions:

1. **The Litchfield Province** - Consists of isoclinally folded amphibolite-greenschist facies metamorphic
2. **The Central Region** – sub-greenschist dominated by upright NW and N trending folds and simple structure geometry.
3. **The Rum Jungle Region** – Achaean metamorphic and granitic basement with poly phase upright folding domes and basins.
4. **The South Alligator Region** – lower greenschist metamorphism with N-NW trending upright folds
5. **The Alligator Rivers Region** – Amphibolite facies metamorphism and upright to recumbent fold patterns

**Local Geology**

EL 27567 is underlain by sediments of the Lower Proterozoic Burrell Creek Formation which are dominated by flysch derived greywackes and thinly bedded siltstones. Intrusive granite is spatially within the localised area with significant hornfelsing of the sediments adjacent to these intrusive bodies. Structurally the area is dominated by north plunging open folding with younger north-east trending cross faults. Figure 2.

Mineralisation is dominated by tin within the northern Mt Wells area of the licence although small copper and gold shows exist in the vicinity. Larger gold mines such as Union Reefs and Spring Creek are within a few kilometres of the EL.

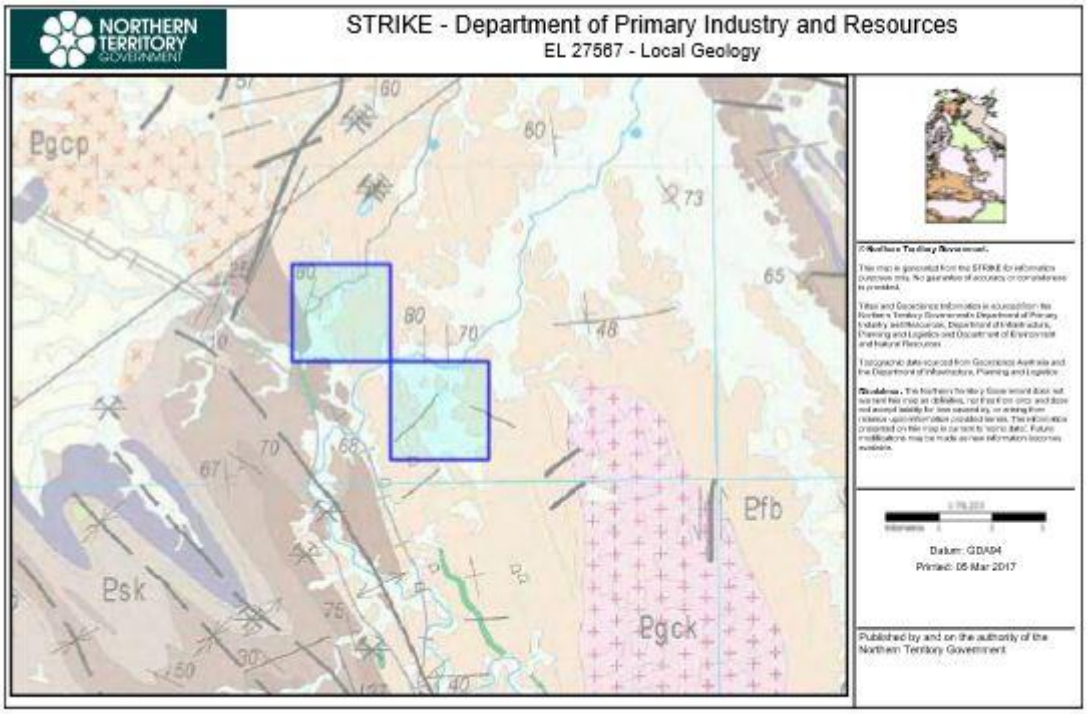


Figure 2 Local Geology EL 27567

**Previous Exploration**

Although previous exploration in the Mt Wells area has been strong in the area since the early 1990's the most extensive work done on the licence proper was conducted by Northern Gold NL and then Acacia Resources Ltd in 2001 and 1997 respectively (Kookaburra Project). Northern Gold completed a soil program (200m x 50m) in the northern block and Acacia incorporated the area into a much larger stream sediment sampling program (figure 3).

The stream sediment survey undertaken by Acacia was multi element assayed whilst Northern Gold only analysed for gold with its soil sampling. Thematic maps of the results are shown below (Figures 4-7).

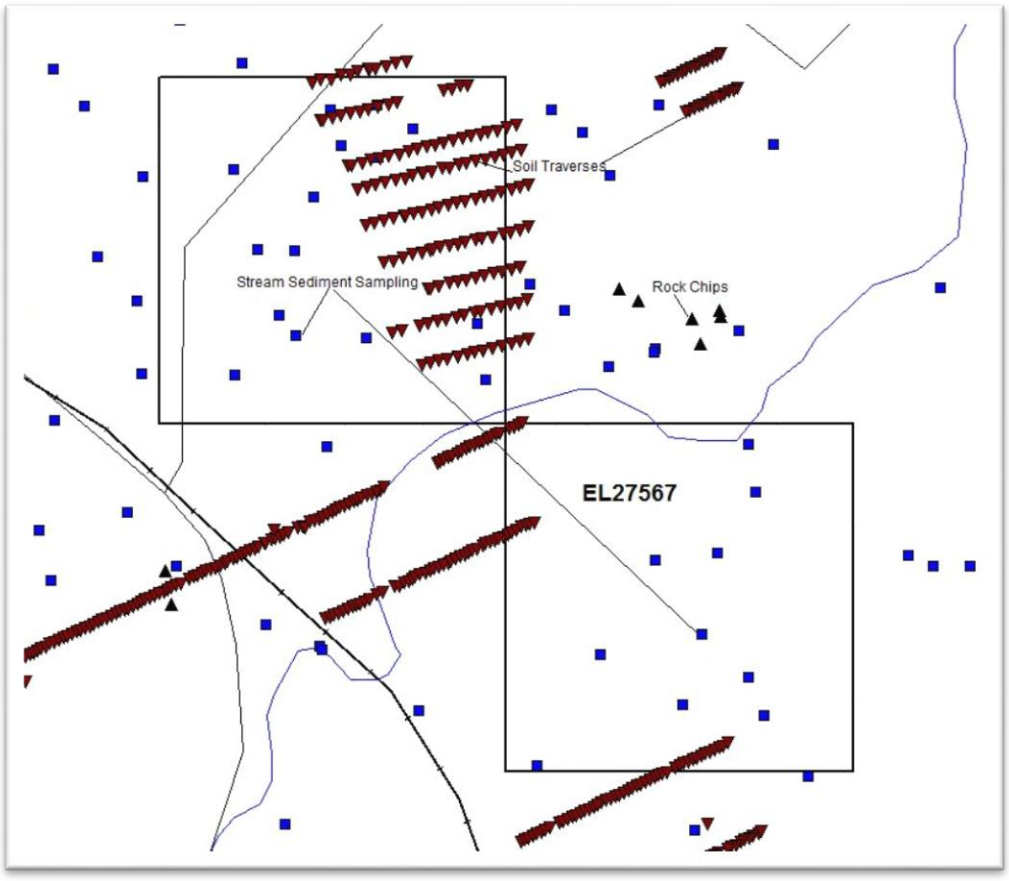


Figure 3 – Historic Geochemistry – EL 27567

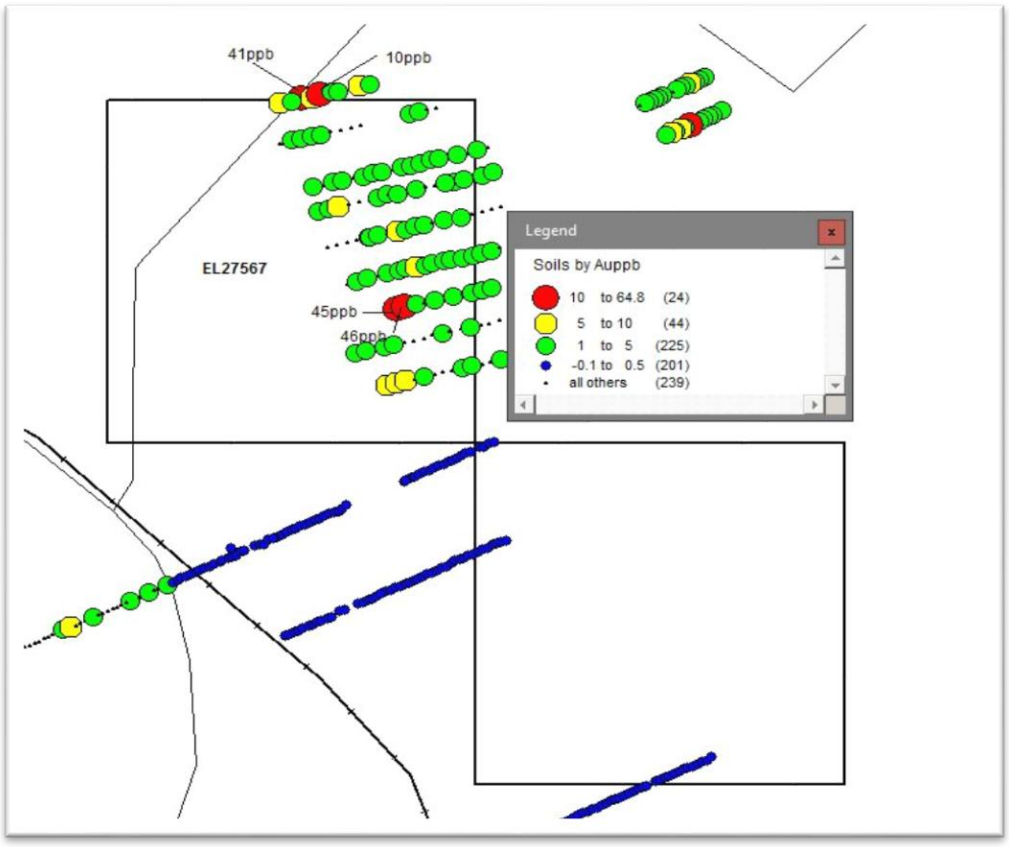

Figure 4 – Northern Gold Soils Auppb

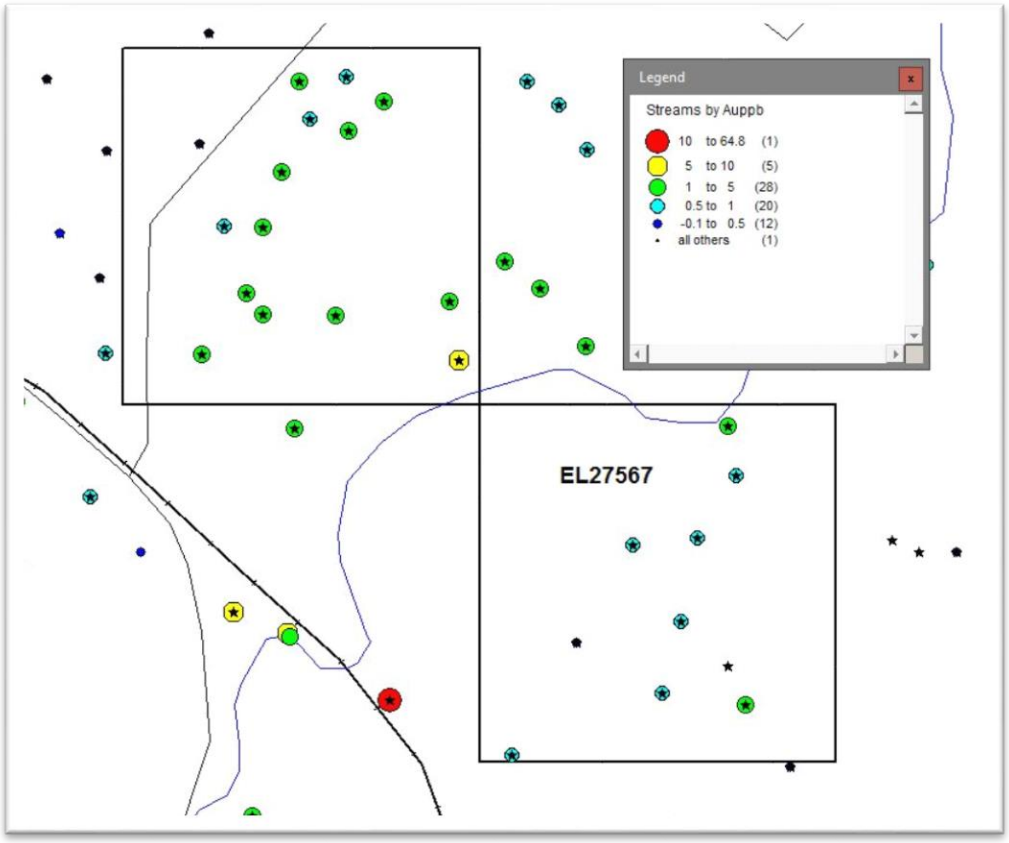


Figure 5 – Acacia Resources – Streams Au ppb

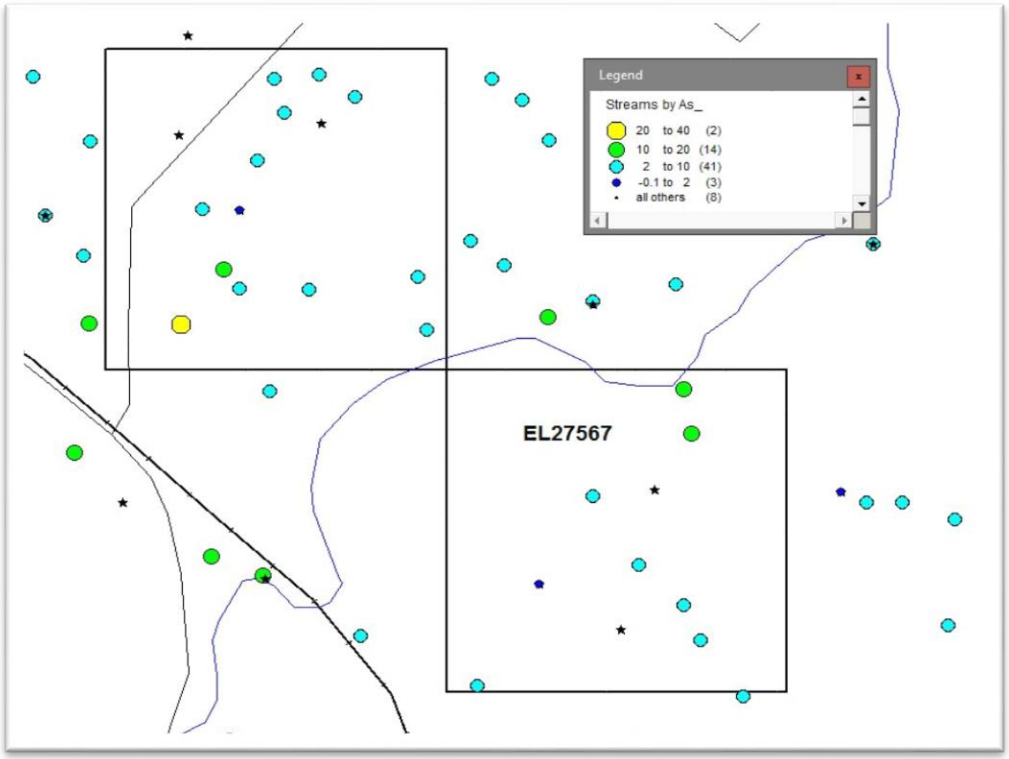

Figure 6 – Acacia Resources – Streams As ppm

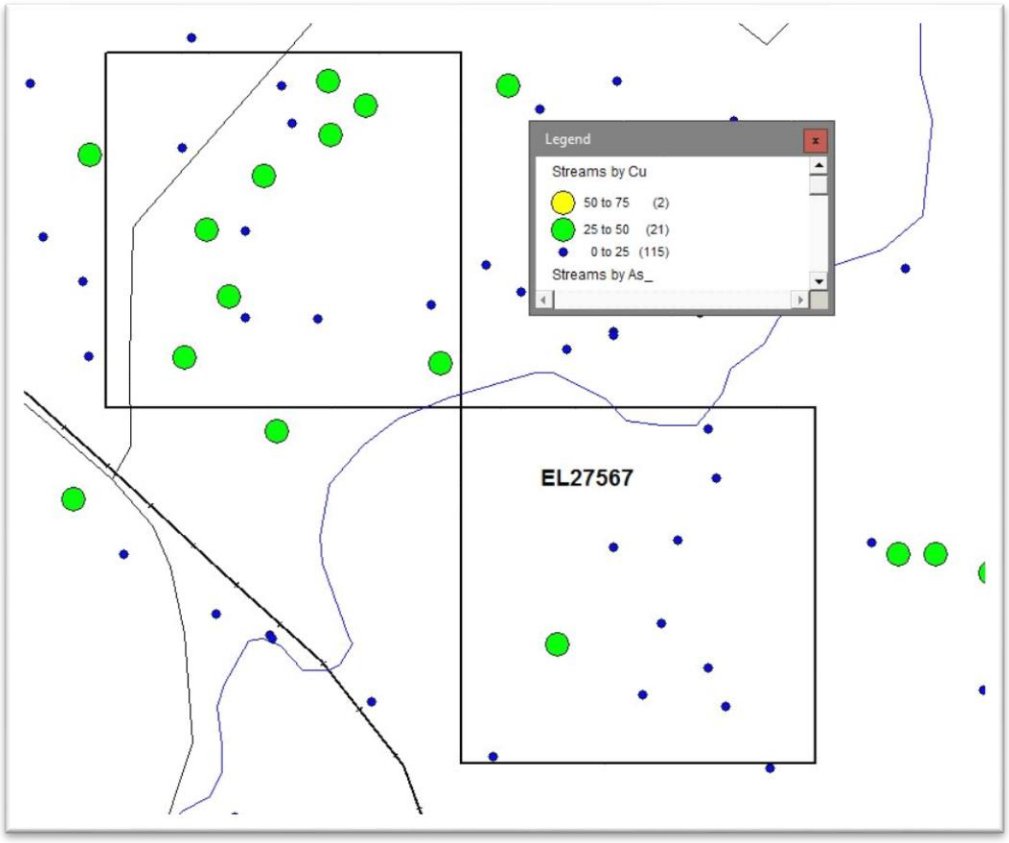


Figure 6 – Acacia Resources – Streams Cu ppm

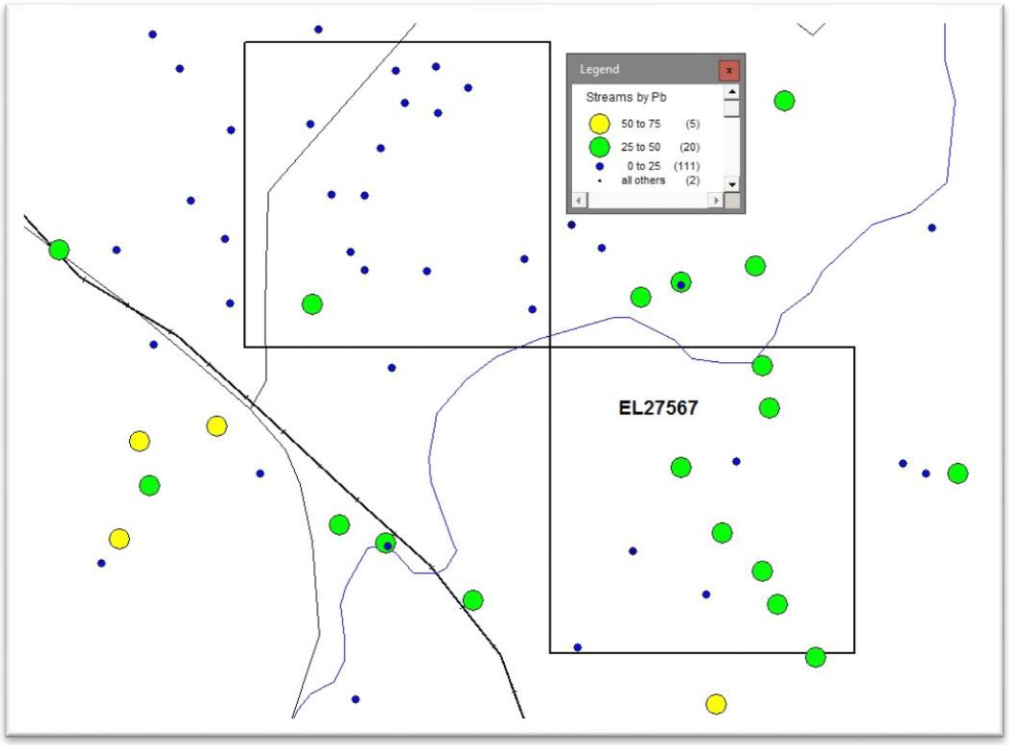

Figure 7 – Acacia Resources – Streams Pb ppm

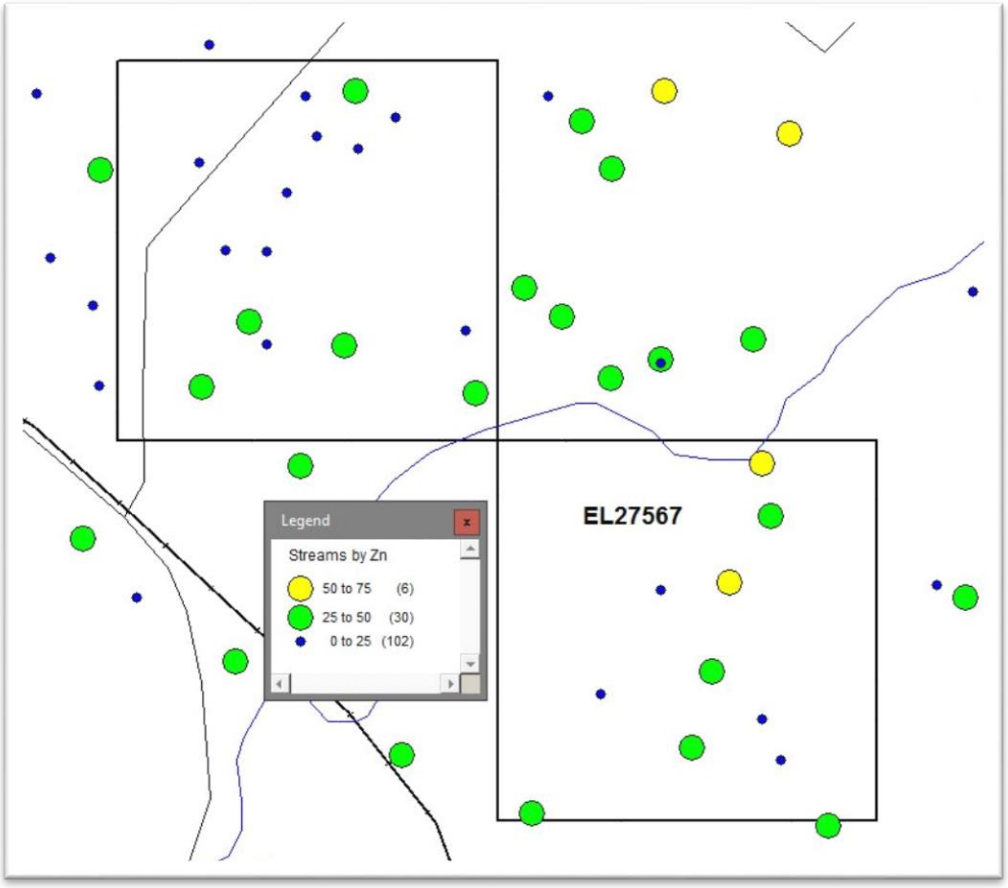


Figure 8 – Acacia Resources – Streams Zn ppm

**Results**

**Soil Survey – Northern Gold NL 2001**

The soil campaign generated peak results of 46, 45 and 41 ppb Au whilst the rest of the results were generally flat with little correlation between survey lines indicating a mineralised structure. The peak results probably correspond with very localised mineralisation that is very common within the Pine Creek area and differing from large scale fertile anomalous structures, that are associated with the larger mines in the PCG.

**Stream Sediment Survey – Acacia Resources Ltd 1997**

Acacia conducted a regional stream sediment sampling program over the current tenement area. Sample sites were selected from aerial photos and 5 kg of sample was taken and sieved to -2mm# and analysed for Au and Ag by BLEG. From the -2mm#, 200g was sieved to -70# and analysed for Cu, Pb and Zn by AAS.

Results were reasonably poor with the only real anomalous sample of 6.1 ppb Au generated in the SE corner of the northern block. Base metals were also relatively subdued with peak values of 39ppm Cu, 38ppm Pb, 52ppm Zn and 58ppm Ag.

**Scope for Further Work**

The tenement is relatively mature in an exploration sense with the area picked over by various entities due to its proximity to the Mt Wells tin field, Spring Hill Gold field and the Union Reefs gold mine.

With a comprehensive stream sediment program completed and some soil sampling in a significant portion of the northern block the only realistic thing to do would be to follow up on the anomalous soils and stream sediment results with a rock chip campaign to see if the anomalous results can be explained.

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